

25 May 1984

Safety

SAFETY APPROVAL FOR LASER IRRADIATION
OF AIRCRAFT AND SATELLITES

This regulation assigns responsibilities for evaluating potential safety hazards associated with laser irradiation of aircraft or spacecraft, and establishes procedures to be followed in obtaining safety approval for programs involving such operations. It applies to all Space Division (SD) Staff Agencies, Program Offices and Field Organizations.

1. TERMS EXPLAINED:

a. Laser - Any device using molecular amplification by stimulated emission of radiation and operating with an output wavelength of 0.2 micrometers to 20 micrometers.

b. Safety Portion of Laser Technology Program Documentation - A brief summary of safety considerations involved with the use of laser devices which could expose aircraft or spacecraft to laser radiation.

c. Free Space Use of Laser Device - The operation of any laser device in such a way as to make possible intentional or inadvertent irradiation of aircraft or spacecraft.

2. SD POLICY:

a. Support of executive policy on free space test and use of laser devices causes SD to set positive controls to stop dangerous illumination of normal air and space traffic. Therefore, any SD conducted or sponsored work which involves experimental, test or operational use of a laser device in such a way as to make possible intentional or inadvertent irradiation of aircraft or satellites must

meet the specific approval requirements specified in this regulation.

b. Consider laser safety in the complete life cycle of the laser system. For example, hazard potential must be considered in the concept phase; controls must be established in the definition phase; and when possible, controls will be designed in the system during development phase; and will be continually examined in the installation and operational phases of the laser system to assure the adequacy of hazard control procedures.

3. APPLICATION OF THIS REGULATION:

a. Provisions of this regulation apply when:

(1) SD has any development, test, or operational responsibility for free space application of a laser device.

(2) A laser device developed by an agency other than SD is to be operated in free space on an installation under SD control. Ownership or custodianship of the laser device does not affect the applicability of this regulation.

b. Provisions of this regulation do not:

(1) Apply to laser illumination of surface based equipment or personnel, nor to irradiation of hostile aircraft in combat situations.

(2) Alter in any way the requirements for USAF medical service review and certification of all laser operations conducted by USAF activities. Those requirements are separate and distinct from the requirements of this regulation. (See AFOSH STD 161-10).

4. RESPONSIBILITIES.

a. The System Program Director (SPD) or project manager involved

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with free space use of a laser device will:

(1) Notify SD/SE of the intended operation as soon as such use of laser devices is identified. Give initial notification in writing and include, as a minimum, the following data:

(a) Brief summary of laser program describing how, why, where, and when the laser system will be operated.

(b) Description of laser system to include lasing material, operating wavelength, maximum output energy, pulse width, PRF, beam diameter, beam divergence and a description of optics used in conjunction with the system if applicable.

(2) Ensure that compliance with the provisions of this regulation is a prerequisite for approval of operations (involving free space use of a laser device for SD operations) which are not conducted on SD operated installations.

b. SD Directorate of Safety (SE) will:

(1) Coordinate with the system program director and SD/SG in reviewing the laser technology program documentation for compliance with applicable USAF policy and determine the necessity for further action.

(2) Cooperate with the system program director in taking necessary action indicated in table 1.

TABLE 1

PROCESSING OF THE LASER TECHNOLOGY PROGRAM

R U L E	If program indicates:	SPD will:
1	Inadvertent exposure of normal air traffic is possible.	Assure that coordination is affected with appropriate installation commanders and/or regional Federal Aviation Agency (FAA) offices to assure necessary controlled firing areas are established.
2	Consent and approval of agency operating target aircraft or spacecraft has been obtained.	Evaluate for action under rule 1.
3	Laser irradiation of target craft will not exceed DDR&E and established maximum safe exposure levels.	Evaluate for action under rule 1.
4	Laser irradiation of target craft is authorized by DDR&E reviewed and approved project or program plan.	Evaluate for action under rule 1.
5	Conditions specified in either 2, 3, or 4 above have not been satisfied.	Evaluate for action under rule 1 and concurrently forward to HQ AFSC with request for DDR&E review and approval.

NOTE: After processing as above, SD/SE will develop a SD safety position indicating approval or disapproval of the safety portion of the laser technology program. When approved by SD, the safety portion of the program documentation becomes directive in nature and compliance by operating agencies is mandatory.

c. SD/SG will provide professional assistance to program offices and SD/SE in preparing and evaluating the laser technology program documentation with particular emphasis on evaluation of potential health hazards and controls.

d. SD Commanders will ensure that compliance with the provisions of this regulation is a prerequisite for approval of operations involving free space use of laser device.

5. SAFETY REVIEW PROCESS:

a. SPD or project manager of programs involving free space use of laser devices is responsible for the safety analysis of those systems and for assuring that the following safety approval requirements are fulfilled:

(1) Establish positive action to insure that inadvertent laser illumina-

tion of normal air and space traffic is precluded.

(2) Secure consent and approval of the organization responsible for the operational safety of target aircraft or spacecraft, or

(3) Determine that irradiation of target craft will not exceed maximum safety exposure levels prescribed by the Director of Development Research and Engineering (DDR&E), or

(4) Be authorized by a project or program plan reviewed and approved by DDR&E.

b. The safety portion of the laser technology program is the basic document by which the SPD fulfills safety responsibilities. The SPD will assure that safety considerations listed in the documentation are satisfied. Primary safety assistance to the SPD is provided through the coordinating efforts of the SD Directorate of Safety and Staff Surgeon.

OFFICIAL

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Attachment

SUMMARY OF CHANGES

This revision includes additional laser description data to be submitted to SD/SE, reflects current agency/office designations, and expands the list of "Other Hazard Considerations" on Attachment 1.

GENERAL GUIDE FOR SAFETY PORTION OF LASER
TECHNOLOGY PROGRAM

The following outline is a general guide for the contents of the safety portion of program documentation. Additional information may be included to clarify specific applications. SD/SE and SD/SG may be contacted about the coverage needed in specific topical areas.

- a. Mission Description (4) Cryogenic Materials
- b. Laser System Description (5) Ultraviolet Radiation
- c. Operating Agency (6) X-Radiation
- d. Operating Times (7) Visible Light
- e. Safety Responsibilities (8) Environmental Control
- f. Laser Hazard Analysis: (9) High-Pressure Gas Systems
 - (1) Exposure Criteria (10) General Fire Hazard
 - (2) Safety Exposure Distances (11) Noise
 - (3) Ground Operation Hazards (12) Tripping and Falling Objects
 - (4) Hazards to Aircraft
- g. Other Hazard Considerations:
 - (1) High Voltage
 - (2) Toxic Chemicals
 - (3) Projectiles from Catastrophic Failure
- h. Safety Procedures:
 - (1) Ground Exposures
 - (2) Target Exposures
 - (3) Inadvertent Aircraft Exposures
- i. Safety Conclusion